ATTACHMENT B

Route Alternative Analysis & Map for Southern Access Expansion and co-located Southern Lights Pipeline

Enbridge Route Alternatives Analysis
Southern Access Expansion Program and
Co-Located Diluent Return Line (Southern Lights)

1.0 Introduction

The pipeline routing analysis process is a fundamental early step in a pipeline project. The process has been conducted as an interdisciplinary analysis that includes the various internal groups in the project team. Analysis of alternatives and ultimately selection of a proposed pipeline route is an iterative process, and involves route refinement that becomes more and more focused as the routing analysis proceeds.

The intent of this report is to summarize the routes which were considered from Enbridge's Delavan pump station near Whitewater, in Rock County Wisconsin (hereinafter "Delavan" to the Company's Flanagan Terminal Facility in Livingston County (hereinafter "Flanagan"). The document summarizes the route investigation work initially conducted by the Enbridge Business Development Group and further evaluated and refined by a multi-disciplinary project team consisting of representatives from the Company's Engineering, Environmental, Right-of-Way and Government & Regulatory Affairs departments. The report also documents the environmental and engineering issues that were considered in evaluating the various route alternatives.

1.1 Hierarchical Selection Approach

A rational and defensible route selection approach involves consideration of environmental, engineering, and economic factors in a multi-disciplinary, iterative fashion. The approach adopted for the Southern Access Expansion Program involved a hierarchical routing analysis from high-level conceptual consideration of routing options, through identification of major route alternatives within a broad state-level corridor, to selection and refinement of a preferred route within this corridor. At each step, the data sources that were utilized matched the degree of detail required and the relative importance assigned to each multi-disciplinary factor. A detailed description of the route evaluation criteria is included in Appendix A.

1.2 Route Alternatives

At the formative stage of the Southern Access Project, consideration was given to routing options at a higher level using general criteria such as overall pipeline length, hydraulic design, potential environmental and socioeconomic impacts and cost. Opportunities for co-location with existing linear facilities were also evaluated to minimize environmental impacts.

Initially, the evaluation included co-location within existing pipeline corridors, as well as road rights-of-ways and electrical transmission lines.

Road co-location was deemed an unfavorable alternative and precluded at an early stage in the analysis based on six principal factors:

- lack of any identifiable provision for pipeline co-location under state regulations covering interstate highway use;
- steep sideslopes (embankments or cuts) along many sections of road right-of-way;

- insufficient construction workspace along many sections of road right-of-way;
- safety concern due to the large amount of heavy equipment that would be operating directly adjacent to highway traffic;
- development generally occurs adjacent to roadways, and highways, connect populated areas, which would bring the pipeline facilities closer to developed areas, which is contrary to the desire to site the pipeline facilities in such a way as to minimize exposure to populated areas;
- potential future interference due to ditch maintenance or roadway expansion.

Based on the broad-scale criteria, an alternative that maximized the use of Enbridge's existing right-of-way was selected as the preferred Southern Access Route. The route originates at Enbridge's Superior, WI terminal facility (hereafter "Superior"), follows Enbridge's Line 6A/14 easement to Delavan. From there the routing extends through Boone, DeKalb, LaSalle and Livingston Counties, to a terminus near the Flanagan.

In summary, the route selected as the "preferred" route demonstrates the most beneficial combination of cost- and environmental impact-reducing features: relatively low level of incremental energy consumption for operation; direct interconnect with the Flanagan Tank Farm; regulatory simplification based on presence in only two states; co-location along Enbridge's existing pipeline corridor in Wisconsin.

A more detailed second-tier evaluation was assimilated into the Wisconsin/Illinois Corridor Alternatives and formed the fundamental determinants of routing through Illinois.

South of Delavan, the routes that were identified in the second-tier screening consisted of three primary alternatives between Delavan and Flanagan. These segments are shown in Appendix B and, where applicable, are named according to collocated pipelines, as follows.

Delavan to Flanagan

- Segment A – West Alternative
- Segment B – Guardian Alternative
- Segment C – Enbridge Line 14 Alternative

Basic descriptions of these segment alternatives are provided in Sections 1.3.2. The alternatives analysis that was undertaken to select the preferred route is described in Sections 1.3.3.

1.3 Wisconsin/Illinois Corridor

1.3.1 Superior to Delavan

This portion of the proposed route runs across Wisconsin in a generally southeast direction for approximately 321 miles, following Enbridge's existing Line 6/14 easement from Superior in Douglas County, through Washburn, Sawyer, Rusk, Chippewa, Taylor, Clark, Marathon, Wood, Adams, Marquette, Columbia, Dane, and Jefferson Counties, to the existing Delavan, WI pumping station in Rock County. Enbridge anticipates that the pipeline would be installed within existing right-of-way, except for locations where site-specific environmental and/or engineering issues might require minor deviations.

1.3.2 Delavan to Flanagan

Three route segment alternatives (A – C) were identified between Delavan and Flanagan.

Segment A (West Alternative) runs due south from Delavan through Boone, DeKalb, LaSalle, and Livingston Counties, IL to Flanagan. This approximately 130.6-mile-long greenfield segment represents the most direct line between the two nodal points, while avoiding major population centers.

Segment A was identified as an alternative because it minimizes route length and avoids the more densely populated areas on the fringes of Chicago to the east. This alternative is not co-located to another utility however, it is predominantly rural/agricultural, and provides the flexibility to avoid smaller population centers, areas of future development and minimize sensitive environmental feature impacts.

Segment B (Guardian Alternative) runs southeast from the Delavan Pump Station in Rock County, WI for approximately 20 miles along Enbridge's existing Line 6/14 right-of-way. From this point it heads south into Illinois, following the Guardian Pipeline right-of-way for approximately 65 miles through Boone and DeKalb Counties to Plano in Kendall County. Near Plano, the route turns southwest for approximately 10 miles, at which point it runs south for approximately 45 miles, following the same course to Flanagan as Segment A (West Alternative).

Segment B was identified as an alternative because it follows a relatively straight course between Delavan, WI and Flanagan, IL and is collocated along existing pipeline rights-of-way for approximately 60 percent of its 141-mile length.

Segment C (Enbridge Line 14 Alternative) runs southeast from the Delavan Pump Station in Rock County, WI for approximately 35 miles to a point near Harvard in McHenry County, IL. From here it continues south for approximately 55 miles through Kane County to Plano in Kendall County, at which point it continues southwest and then south, following the same course as Segment B.

Segment C was identified as an alternative because it follows a relatively straight course between Delavan, WI and Flanagan, IL and is collocated along existing pipeline rights-of-way for approximately 63 percent of its 144-mile length.

1.3.3 Route Comparison

Having identified the Delavan to Flanagan segments as the route group from which a preferred route would be selected, a more detailed comparison of the three alternative route segments (A – C) was undertaken. Using mapping and database resources, the following engineering and environmental features were investigated for each segment:

- Route Length
- Counties (number crossed)
- Co-location Length
- Federal Land (number of crossings/total length)
- State Land (number of crossings/total length)
- County/Local Land (number of crossings/total length)
- Perennial Waterbody Crossings (number)

- Wetland Crossings (number of crossings/total length)
- Developed Areas (number)
- Steep Terrain (total length)
- Shallow Bedrock (total length)
- Forested Land (total length)
- Agricultural Land (total length)
- High Consequence Areas (number/total length)

These features can be considered "broad-scale" criteria for route segment comparison and are listed in some order of logical importance for a "typical" alternatives analysis. A more detailed description of the route evaluation criteria provided in Appendix A. However, prioritization can change based on project-specific circumstances. Other features, such as protected species, cultural resources, and water supply wells can be considered "fine-scale" criteria and are more typically used for route refinement once a preferred route has been identified. For each route segment A through C, Table 1 provides the quantitative information that was developed for each broad-scale criterion from the map and database review. In addition, high consequence areas are described and summarized in Appendix C.

TABLE 1
Environmental Route Evaluations
Delavan to Flanagan

Feature	Unit	Delavan, WI to Flanagan, IL Segment			Source
		Alternative A	Alternative B	Alternative C	
Length	miles	130.6	141.2	143.8	USGS Land Use
Counties Crossed	number	5	6	6	ESRI
Co-located w/existing utility	miles/%	0 / 0%	85 / 60%	90 / 63%	Penwell/NPMS
Federal Land	number/ length (ft)	0	0	0	ESRI
State Land	number/ length (ft)	0	0	0	ESRI
County/Local Land	number/ length (ft)	0	0	1 4,030	ESRI
Perennial Waterbody Crossings	number	24	31	30	ESRI
Wetland Crossings	number/ length (ft)	17 4,171	25 8,437	68 26,295	WWI, NWI
Developed Areas[1]	number	3	3	6	ESRI
Steep Terrain (slopes ≥15%)	miles	5.7	5.9	15.5	USGS - DEMs
Shallow Bedrock	feet	11,579	8,078	8,547	STATSGO (Alts. A,B,C) USGS - DEMs (Alts. D,E,F,G)
Forested Land	miles	4.8	4.2	6.3	USGS Land Use
Agricultural Land	miles	123.9	135.0	143.8	USGS Land Use
Prime Farmland	miles	111.4	122.5	121.2	STATSGO
High Consequence Areas	miles	0	5.4	13.4	NRE

1.3.4 Preliminary Preferred Route

Segments A was determined to be the preferred route alternative. The selection rationale for each of these segments is provided in the form of a comparative list of advantages and disadvantages in Sections 1.3.4.1 below.

1.3.4.1 Delavan, WI to Flanagan, IL

Segment A (West Alternative)

Advantages

- At least 10 miles shorter than Segments B or C.
- Fewer counties crossed than Segments B or C.
- At least six fewer perennial waterbody crossings than Segments B or C.
- At least eight fewer wetland crossings than Segments B or C.
- Approximately one-half the total wetland crossing length of Segment B and less than one-fifth of the total wetland crossing length of Segment C.
- Greenfield route location avoids areas of increasing population density and residential/commercial expansion further east towards the Chicago area.
- Greenfield route location precludes potential public perception concerns relating to the creation of utility "superhighways" along existing corridors further east towards the Chicago area.

Disadvantages

- Cost reductions and certain environmental benefits associated with co-location are not realized.

1.4 Route Refinement Process

1.4.1 Superior to Delavan (Not Applicable)

1.4.2 Delavan to Flanagan

Following selection of the preferred route, attention was focused on route refinements, taking into consideration the fine-scale criteria.

- Protected Species
- Cultural Resources
- Contaminated Areas
- Agricultural Lands
- Transportation Crossings
- Water Supply Wells
- Property Lines
- Wetlands

MS Terra Server Photomosaic Imagery (1998, 1999, 2001) was used to prepare a preliminary set of aerial alignment sheets (Scale: 1 inch = 500 feet) for the preferred route south of Delavan, WI. Examination of this imagery enabled the preferred route to be realigned, with consideration given to details that were not available on the larger-scale maps that were used to draw the original route segments. Attention was focused on route realignment relative to various landscape features, including residential

proximity, property line locations, road and waterbody crossings, foreign utility crossings, forested land, and wetlands.

The route was realigned into agricultural areas and adjacent to fence lines, where appropriate. Obvious drain-tiled areas were circumvented or crossed perpendicularly. Crossings of forested land, wetlands, and waterbodies were eliminated or shortened where possible. Subdivisions, commercial areas, and schools were avoided. Realignments were implemented to reduce road and railroad crossings and to capture "double crossings" (e.g., roads, railroad and/or pipelines).

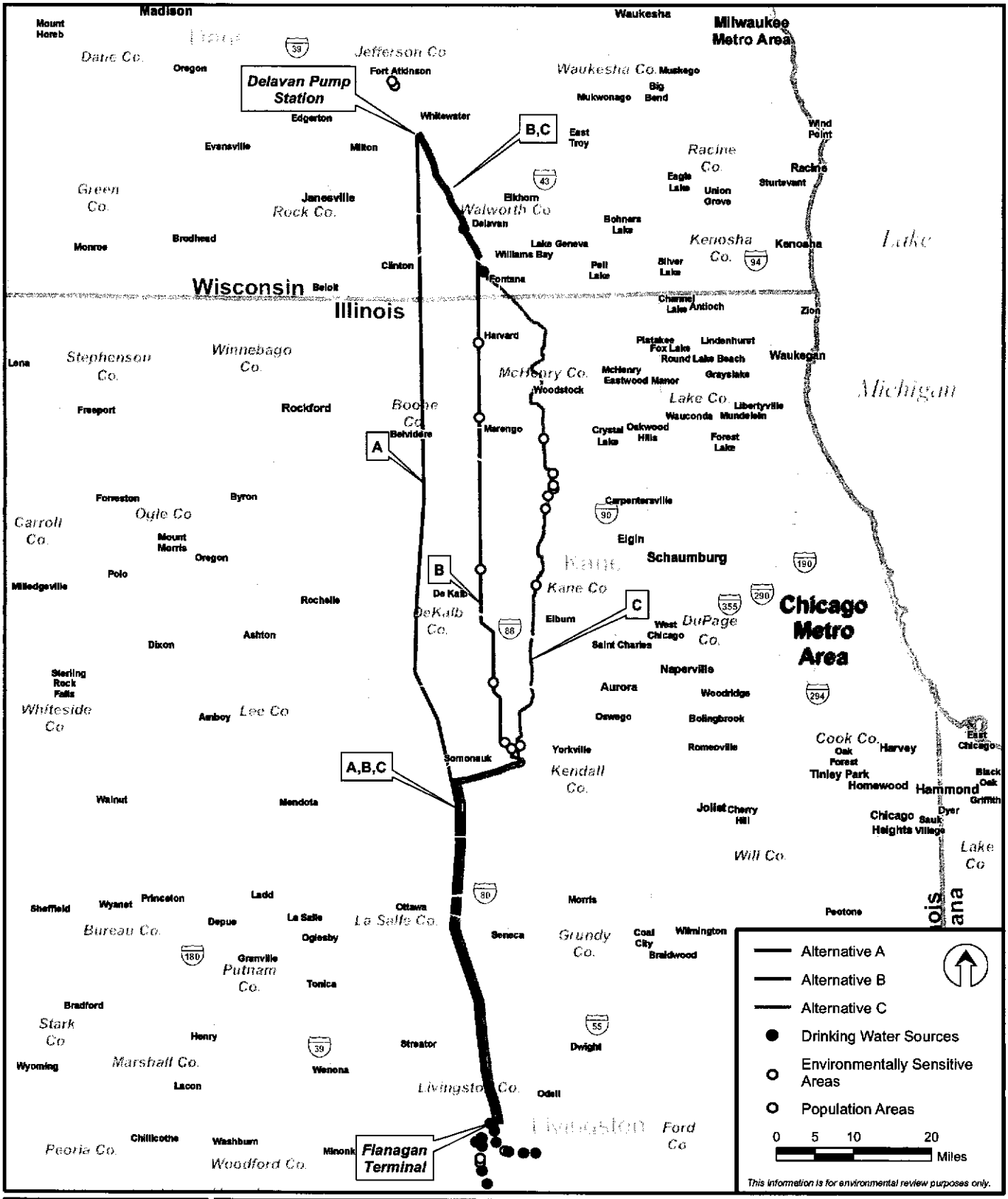
Based on examination of the preliminary alignment sheets, several features and issues were identified that merited closer field observation. Those in Illinois included:

- Golf Course/Wetland Complex – Boone County
- Tributary to the Illinois River – LaSalle County
- Illinois River/State Park – LaSalle County
- Flanagan Tank Farm – Livingston County
- Landfill Area – Livingston County

An aerial flyover was subsequently conducted and several route refinements were made on the basis of this reconnaissance. Those relevant to Illinois included:

- Route realignment at Kishwaukee River (Boone County)
- Route realignment at Fox River (La Salle County)
- Route realignment at Illinois River to reduce impacts to forested land and to avoid state park and adjacent canal. (La Salle County)

Route refinement will continue at some level throughout project development, based on public and regulatory consultation results.



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Enbridge Southern Access Expansion Program
High Consequence Areas

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